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geometry object distance relationship and filter condition and query result set

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1 [Level set and PDE methods for computer graphics](#)

David Breen, Ron Fedkiw, Ken Museth, Stanley Osher, Guillermo Sapiro, Ross Whitaker
 August 2004 **ACM SIGGRAPH 2004 Course Notes SIGGRAPH '04**

Publisher: ACM Press

Full text available: [pdf\(17.07 MB\)](#) Additional Information: [full citation](#), [abstract](#), [citations](#)

Level set methods, an important class of partial differential equation (PDE) methods, define dynamic surfaces implicitly as the level set (iso-surface) of a sampled, evolving nD function. The course begins with preparatory material that introduces the concept of using partial differential equations to solve problems in computer graphics, geometric modeling and computer vision. This will include the structure and behavior of several different types of differential equations, e.g. the level set eq ...

2 [Exploiting perception in high-fidelity virtual environments: Exploiting perception in high-fidelity virtual environments](#)

Additional presentations from the 24th course are available on the citation page

Mashhuda Glencross, Alan G. Chalmers, Ming C. Lin, Miguel A. Otaduy, Diego Gutierrez
 July 2006 **ACM SIGGRAPH 2006 Courses SIGGRAPH '06**

Publisher: ACM Press

Full text available: [pdf\(5.07 MB\)](#) [mov\(68.6 MIN\)](#) Additional Information: [full citation](#), [abstract](#), [references](#)

The objective of this course is to provide an introduction to the issues that must be considered when building high-fidelity 3D engaging shared virtual environments. The principles of human perception guide important development of algorithms and techniques in collaboration, graphical, auditory, and haptic rendering. We aim to show how human perception is exploited to achieve realism in high fidelity environments within the constraints of available finite computational resources. In this course w ...

Keywords: collaborative environments, haptics, high-fidelity rendering, human-computer interaction, multi-user, networked applications, perception, virtual reality

3 [The elements of nature: interactive and realistic techniques](#)

Oliver Deussen, David S. Ebert, Ron Fedkiw, F. Kenton Musgrave, Przemyslaw Prusinkiewicz, Doug Roble, Jos Stam, Jerry Tessendorf
 August 2004 **ACM SIGGRAPH 2004 Course Notes SIGGRAPH '04**

Publisher: ACM Press

Full text available: [pdf\(17.65 MB\)](#) Additional Information: [full citation](#), [abstract](#)

This updated course on simulating natural phenomena will cover the latest research and production techniques for simulating most of the elements of nature. The presenters will provide movie production, interactive simulation, and research perspectives on the difficult task of photorealistic modeling, rendering, and animation of natural phenomena. The course offers a nice balance of the latest interactive graphics hardware-based simulation techniques and the latest physics-based simulation techni ...

4 Collision detection and proximity queries

 Sunil Hadap, Dave Eberle, Pascal Volino, Ming C. Lin, Stephane Redon, Christer Ericson
August 2004 **ACM SIGGRAPH 2004 Course Notes SIGGRAPH '04**

Publisher: ACM Press

Full text available:  [pdf\(11.22 MB\)](#) Additional Information: [full citation](#), [abstract](#)

This course will primarily cover widely accepted and proved methodologies in collision detection. In addition more advanced or recent topics such as continuous collision detection, ADFs, and using graphics hardware will be introduced. When appropriate the methods discussed will be tied to familiar applications such as rigid body and cloth simulation, and will be compared. The course is a good overview for those developing applications in physically based modeling, VR, haptics, and robotics.

5 GPGPU: general purpose computation on graphics hardware

 David Luebke, Mark Harris, Jens Krüger, Tim Purcell, Naga Govindaraju, Ian Buck, Cliff Woolley, Aaron Lefohn
August 2004 **ACM SIGGRAPH 2004 Course Notes SIGGRAPH '04**

Publisher: ACM Press

Full text available:  [pdf\(63.03 MB\)](#) Additional Information: [full citation](#), [abstract](#), [citations](#)

The graphics processor (GPU) on today's commodity video cards has evolved into an extremely powerful and flexible processor. The latest graphics architectures provide tremendous memory bandwidth and computational horsepower, with fully programmable vertex and pixel processing units that support vector operations up to full IEEE floating point precision. High level languages have emerged for graphics hardware, making this computational power accessible. Architecturally, GPUs are highly parallel s ...

6 Special issue on spatial database systems: An introduction to spatial database systems

Ralf Hartmut Güting

October 1994 **The VLDB Journal — The International Journal on Very Large Data Bases**, Volume 3 Issue 4

Publisher: Springer-Verlag New York, Inc.

Full text available:  [pdf\(2.50 MB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#)

We propose a definition of a spatial database system as a database system that offers spatial data types in its data model and query language, and supports spatial data types in its implementation, providing at least spatial indexing and spatial join methods. Spatial database systems offer the underlying database technology for geographic information systems and other applications. We survey data modeling, querying, data structures and algorithms, and system architecture for such systems. The em ...

7 Geometric modeling based on triangle meshes: Geometric modeling based on triangle meshes

 Mario Botsch, Mark Pauly, Christian Rossli, Stephan Bischoff, Leif Kobbelt
July 2006 **ACM SIGGRAPH 2006 Courses SIGGRAPH '06**

Publisher: ACM Press

Full text available:  [pdf\(24.22 MB\)](#) Additional Information: [full citation](#), [references](#)

8

Query operations for moving objects database systems



José Moreira, Cristina Ribeiro, Talel Abdessalem

November 2000 **Proceedings of the 8th ACM international symposium on Advances in geographic information systems GIS '00****Publisher:** ACM PressFull text available: [pdf\(824.95 KB\)](#) Additional Information: [full citation](#), [abstract](#), [citations](#), [index terms](#)

Geographical Information Systems were originally intended to deal with snapshots representing a single state of some reality but there are more and more applications requiring the representation and querying of time-varying information. This work addresses the representation of moving objects on GIS.

The continuous nature of movement raises problems for representation in information systems due to the limited capacity of storage systems and the inherently discrete nature of measurement ...

Keywords: movement operations, moving objects, spatio-temporal databases, spatio-temporal uncertainty

9 Real-time shading



Marc Olano, Kurt Akeley, John C. Hart, Wolfgang Heidrich, Michael McCool, Jason L. Mitchell, Randi Rost

August 2004 **ACM SIGGRAPH 2004 Course Notes SIGGRAPH '04****Publisher:** ACM PressFull text available: [pdf\(7.39 MB\)](#) Additional Information: [full citation](#), [abstract](#)

Real-time procedural shading was once seen as a distant dream. When the first version of this course was offered four years ago, real-time shading was possible, but only with one-of-a-kind hardware or by combining the effects of tens to hundreds of rendering passes. Today, almost every new computer comes with graphics hardware capable of interactively executing shaders of thousands to tens of thousands of instructions. This course has been redesigned to address today's real-time shading capabilities ...

10 Rule-based optimization and query processing in an extensible geometric database system



Ludger Becker, Ralf Hartmut Güting

June 1992 **ACM Transactions on Database Systems (TODS)**, Volume 17 Issue 2**Publisher:** ACM PressFull text available: [pdf\(3.35 MB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#), [review](#)

Gral is an extensible database system, based on the formal concept of a many-sorted relational algebra. Many-sorted algebra is used to define any application's query language, its query execution language, and its optimization rules. In this paper we describe Gral's optimization component. It provides (1) a sophisticated rule language—rules are transformations of abstract algebra expressions, (2) a general optimization framework under which more specific optimization algorithms can be ...

Keywords: extensibility, geometric query processing, many-sorted algebra, optimization, relational algebra, rule-based optimization

11 Shape-based retrieval and analysis of 3D models



Thomas Funkhouser, Michael Kazhdan

August 2004 **ACM SIGGRAPH 2004 Course Notes SIGGRAPH '04****Publisher:** ACM PressFull text available: [pdf\(12.56 MB\)](#) Additional Information: [full citation](#), [abstract](#)

Large repositories of 3D data are rapidly becoming available in several fields, including mechanical CAD, molecular biology, and computer graphics. As the number of 3D models grows, there is an increasing need for computer algorithms to help people find the

interesting ones and discover relationships between them. Unfortunately, traditional text-based search techniques are not always effective for 3D models, especially when queries are geometric in nature (e.g., find me objects that fit into thi ...

12 Real-time volume graphics

 Klaus Engel, Markus Hadwiger, Joe M. Kniss, Aaron E. Lefohn, Christof Rezk Salama, Daniel Weiskopf

August 2004 **ACM SIGGRAPH 2004 Course Notes SIGGRAPH '04**

Publisher: ACM Press

Full text available:  pdf(7.63 MB) Additional Information: [full citation](#), [abstract](#)

The tremendous evolution of programmable graphics hardware has made high-quality real-time volume graphics a reality. In addition to the traditional application of rendering volume data in scientific visualization, the interest in applying these techniques for real-time rendering of atmospheric phenomena and participating media such as fire, smoke, and clouds is growing rapidly. This course covers both applications in scientific visualization, e.g., medical volume data, and real-time rendering, ...

13 Special issue: AI in engineering

 D. Sriram, R. Joobbanı
April 1985 **ACM SIGART Bulletin**, Issue 92

Publisher: ACM Press

Full text available:  pdf(8.79 MB) Additional Information: [full citation](#), [abstract](#)

The papers in this special issue were compiled from responses to the announcement in the July 1984 issue of the SIGART newsletter and notices posted over the ARPAnet. The interest being shown in this area is reflected in the sixty papers received from over six countries. About half the papers were received over the computer network.

14 Feature-based similarity search in 3D object databases

 Benjamin Bustos, Daniel A. Keim, Dietmar Saupe, Tobias Schreck, Dejan V. Vranić
December 2005 **ACM Computing Surveys (CSUR)**, Volume 37 Issue 4

Publisher: ACM Press

Full text available:  pdf(5.29 MB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

The development of effective content-based multimedia search systems is an important research issue due to the growing amount of digital audio-visual information. In the case of images and video, the growth of digital data has been observed since the introduction of 2D capture devices. A similar development is expected for 3D data as acquisition and dissemination technology of 3D models is constantly improving. 3D objects are becoming an important type of multimedia data with many promising appl ...

Keywords: 3D model retrieval, content-based similarity search

15 Spatial augmented reality: a modern approach to augmented reality: Modern approaches to augmented reality

 Oliver Bimber, Ramesh Raskar
July 2005 **ACM SIGGRAPH 2005 Courses SIGGRAPH '05**

Publisher: ACM Press

Full text available:  pdf(48.93 MB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

This tutorial discusses the Spatial Augmented Reality (SAR) concept, its advantages and limitations. It will present examples of state-of-the-art display configurations, appropriate real-time rendering techniques, details about hardware and software implementations, and current areas of application. Specifically, it will describe techniques for optical combination using single/multiple spatially aligned mirror-beam splitters, image sources, transparent screens and optical holograms. Furthermore, ...

Topological relationships between complex spatial objects

Markus Schneider, Thomas Behr

March 2006 **ACM Transactions on Database Systems (TODS)**, Volume 31 Issue 1

Publisher: ACM Press

Full text available:  pdf(1.30 MB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

For a long time topological relationships between spatial objects have been a focus of research in a number of disciplines like artificial intelligence, cognitive science, linguistics, robotics, and spatial reasoning. Especially as predicates they support the design of suitable query languages for spatial data retrieval and analysis in spatial databases and geographical information systems (GIS). Unfortunately, they have so far only been defined for and applicable to simplified abstractions of s ...

Keywords: 9-intersection model, Topological predicate, complex spatial data type, proof-by-constraint-and-drawing, topological cluster predicate, topological constraint rule, topological predicate group

17 Facial modeling and animation

 Jörg Haber, Demetri Terzopoulos

August 2004 **ACM SIGGRAPH 2004 Course Notes SIGGRAPH '04**

Publisher: ACM Press

Full text available:  pdf(18.15 MB) Additional Information: [full citation](#), [abstract](#)

In this course we present an overview of the concepts and current techniques in facial modeling and animation. We introduce this research area by its history and applications. As a necessary prerequisite for facial modeling, data acquisition is discussed in detail. We describe basic concepts of facial animation and present different approaches including parametric models, performance-, physics-, and learning-based methods. State-of-the-art techniques such as muscle-based facial animation, mass-s ...

18 Three-dimensional object recognition

 Paul J. Besl, Ramesh C. Jain

March 1985 **ACM Computing Surveys (CSUR)**, Volume 17 Issue 1

Publisher: ACM Press

Full text available:  pdf(7.76 MB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#), [review](#)

A general-purpose computer vision system must be capable of recognizing three-dimensional (3-D) objects. This paper proposes a precise definition of the 3-D object recognition problem, discusses basic concepts associated with this problem, and reviews the relevant literature. Because range images (or depth maps) are often used as sensor input instead of intensity images, techniques for obtaining, processing, and characterizing range data are also surveyed.

19 Distance browsing in spatial databases

 Gísli R. Hjaltason, Hanan Samet

June 1999 **ACM Transactions on Database Systems (TODS)**, Volume 24 Issue 2

Publisher: ACM Press

Full text available:  pdf(460.81 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

We compare two different techniques for browsing through a collection of spatial objects stored in an R-tree spatial data structure on the basis of their distances from an arbitrary spatial query object. The conventional approach is one that makes use of a k-nearest neighbor algorithm where k is known prior to the invocation of the algorithm. Thus if m < k neighbors are needed, the k-nearest neighbor alg ...

Keywords: R-trees, distance browsing, hierarchical spatial data structures, nearest neighbors, ranking

20 Managing uncertainty in moving objects databases Goce Trajcevski, Ouri Wolfson, Klaus Hinrichs, Sam ChamberlainSeptember 2004 **ACM Transactions on Database Systems (TODS)**, Volume 29 Issue 3**Publisher:** ACM PressFull text available:  [pdf\(1.70 MB\)](#)Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

This article addresses the problem of managing Moving Objects Databases (MODs) which capture the inherent imprecision of the information about the moving object's location at a given time. We deal systematically with the issues of constructing and representing the *trajectories* of moving objects and querying the MOD. We propose to model an uncertain trajectory as a three-dimensional (3D) cylindrical body and we introduce a set of novel but natural spatio-temporal *operators* which cap ...

Keywords: Moving Objects Databases

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L3	2	"6263334".pn.	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/03/30 11:10
L4	0	query adj result same geometry adj object same filter	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2007/03/30 11:12
L5	0	query adj result same geometry adj object and filter	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2007/03/30 11:12
L6	2	query adj result and geometry adj object same filter	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2007/03/30 11:15
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L8	3	"707".clas. and (query near3 set) and geometry adj object and filter	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2007/03/30 11:19
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L12	0	"382".clas. and (query near3 set) and geometry adj object and filter	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2007/03/30 11:19
L13	1	"382".clas. and geometry adj object same filter	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2007/03/30 11:20
S1	2	"20050015216"	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/03/30 11:08

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SC Shekhar, S Ravada, S Fetterer, AXLCT Lu - Knowledge and Data Engineering, IEEE Transactions on, 1999 - ieeexplore.ieee.org

... The operations on spatial **objects** include **distance** and boundary ... used to **filter** out many irrelevant **objects** quickly ... Exact **geometry** is then used for the remaining ...

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M Ankerst, G Kastenmuller, HP Kriegel, T Seidl - Proc. SSD, 1999 - Springer

... 1.3 **Geometry-Based Similarity Search** Considerable work on shape ... reports the **objects** ordered by their increasing **filter distance** to the **query object** using an ...

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M Ankerst, G Kastenmuller, HP Kriegel, T Seidl - Proc. ISMB, 1999 - fidschi.informatik.rwth-aachen.de

... visualized, thus providing an impression of the exact **geometry**. ... reports the **objects** ordered by their increasing **filter distance** to the **query object** using an ...

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JA Orenstein, FA Manola - Software Engineering, IEEE Transactions on, 1988 - ieeexplore.ieee.org

... defined curves and surfaces and constructive solid **geometry**) are not used ... a proximity **query**: find all **objects** within a given **distance** of a given **object**. ...

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[\[book\] An Introduction to the Theory of Spatial Object Modelling for GIS - group of 2 »](#)

M Molenaar - 1998 - books.google.com

... 35 in a vector **geometry**. Figure 3.6 Illustration of Conventions 3 and 4

36 Figure 3.7 Relationships between edges and **objects** 37 ...

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[Design and implementation of a visual **query** language for large spatial databases - group of 5 »](#)

AJ Morris, AI Abdelmota, DS Tudhope, BA El-Geresy - ... , 2002. Proceedings. Sixth International Conference on, 2002 - ieeexplore.ieee.org

... road.**geometry** cross county.**geometry** ... of the measure of proximity required, eg within a **distance** of x ... be expressed similarly either with the same **object** type, eg ...

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X Zhou, X Lin, C Liu, J Cao - IJCIS, 2000 - worldscinet.com

... attributes as parameters (eg area, **distance**, and perimeter ... are large and spatial **relationships** are complex ... using the spatial operation on full **object geometry**. ...

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Y Ishikawa, H Kitagawa - Proceedings of ER2001, 2001 - Springer

... **distance**(g, g) θd , (2) where g is a variable, g is a constant **Geometry object**, d is a real constant, and θ ... the **relationship** $S A (n, c, a, l) \subseteq ans(n, c, a, l) \dots$

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RKV Kothuri, S Ravada, D Abugov - Proceedings of the 2002 ACM SIGMOD international conference ..., 2002 - portal.acm.org

... all the benefits of Oracle's **object-relational database** ... that are within a specified **distance** from the ... data and the expensive computational **geometry** required to ...

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M Ankerst, B Braunmüller, HP Kriegel, T Seidl - Proc. of VLDB, 1998 - dbs.informatik.uni-muenchen.de

... of each considered **object** (MBB or data **object**) to the ... in reducing the number of exact **distance** evaluations ... region and can efficiently be used in **filter** steps to ...

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